

Chromalox®

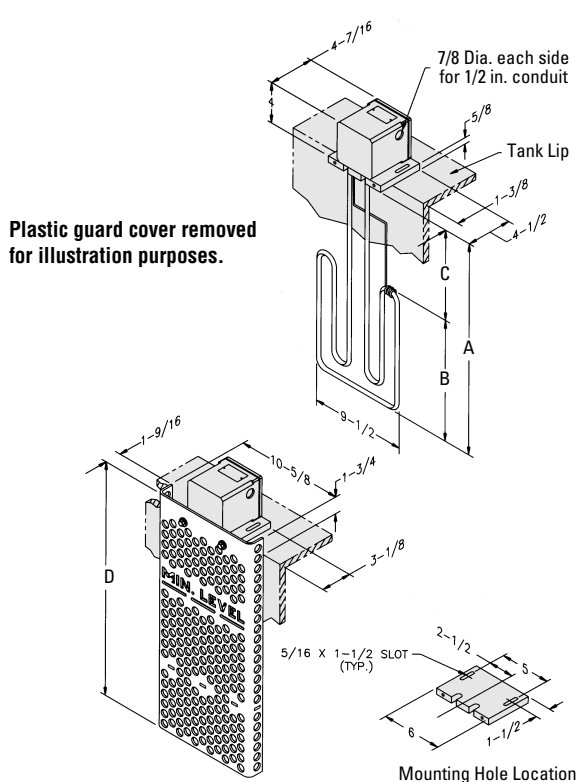
Installation, Operation and Maintenance Instructions

Tuff-Tube™ One and Tuff-Tube™ Three PFA Teflon® Thermoplastic Covered Metal Sheath Over-the-Side Immersion Heater

SERVICE REFERENCE

DIVISION 4	SECTION TPR/TPF
SALES REFERENCE (Supersedes PD437-3)	PD437-4
161-074306-001	
DATE	SEPTEMBER, 1998

TUFF-TUBE™ ONE (TPR)



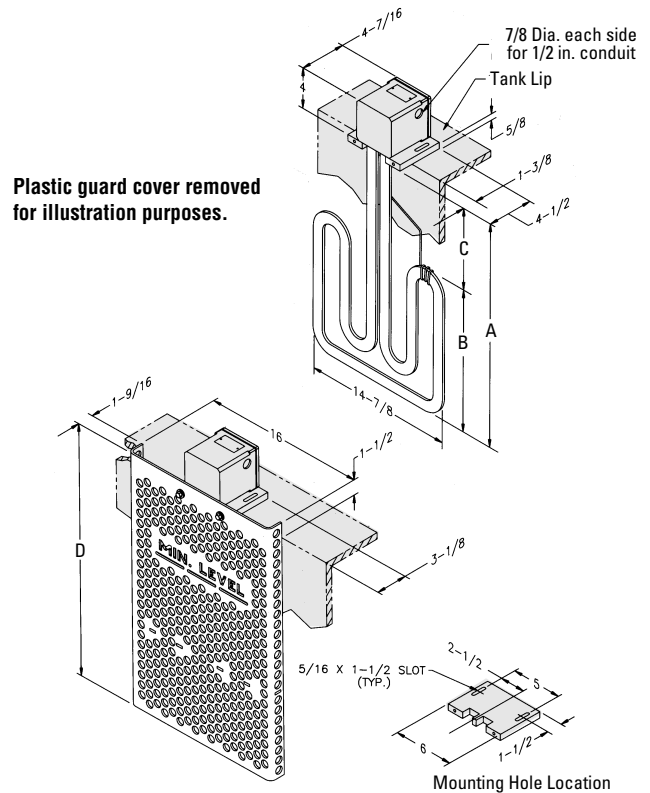
Specifications — Type TPR — Figure 1

Model	Watts	Volts	Phase	Dimensions (In.)			
				A	B*	C**	D
TPR-101 TPR-102	1000	120 240	1 1	13	6	7	15
TPR-202 TPR-204	2000	240 480	1 1	21	12	9	23
TPR-302 TPR-304	3000	240 480	1 1	26	17	9	28
TPR-402 TPR-404	4000	240 480	1 1	31	22	9	33
TPR-602 TPR-604	6000	240 480	1 1	42	33	9	44
TPR-802 TPR-804	8000	240 480	1 1	53	44	9	55

*B Dimension is heated section.

**C Dimension is cold section.

TUFF-TUBE™ THREE (TPF)



Specifications — Type TPF — Figure 2

Model	Watts	Volts	Phase	Dimensions (In.)			
				A	B*	C**	D
TPF-302 TPF-304	3000	240 480	3 3	20	11	9	22
TPF-402 TPF-404	4000	240 480	3 3	23	14	9	25
TPF-602 TPF-604	6000	240 480	3 3	30	21	9	32
TPF-802 TPF-804	8000	240 480	3 3	37	28	9	39
TPF-1002 TPF-1004	10000	240 480	3 3	44	35	9	46

*B Dimension is heated section.

**C Dimension is cold section.

GENERAL

WARNING: This heater is not intended for use in hazardous atmospheres where flammable vapors, gases, liquids or other combustible atmospheres are present as defined in the National Electrical Code. Failure to comply can result in explosion or fire.

Chromalox type TPR and TPF over-the-side immersion heaters are especially suited for heating corrosive solutions to 212°F.

WARNING: It is the responsibility of the purchaser of the heater to make the ultimate choice of sheath material based upon his knowledge of the chemical composition of the corrosive solution, character of the materials entering the solution, and controls which he maintains on the process. Chromalox cannot warrant any electric immersion heater against failure by sheath corrosion if such failure is the result of operating conditions beyond our control.

1. Heater Construction Characteristics
 - A. High quality resistance wire held in place by compacted magnesium oxide in stainless steel sheath and thermoplastic coated.

- B. Medium Watt Density — 20 watts per sq. inch.
- C. Light weight and low profile.
- D. Removable polypropylene guard is standard.
- E. PVC mounting bracket is standard for easy installation.
- F. Element terminals are encapsulated with a self-hardening vapor barrier.
- G. Manual reset cutout to shut off heater in an overtemperature condition is standard.

WARNING: Users should install adequate controls and safety devices with their electric heating equipment. Do not use the overtemperature control as a level control device, damage may result to the coating should an overtemperature condition exist. Where the consequences of failure may be severe, back-up controls are essential. Although the safety of the installation is the responsibility of the user, Chromalox will be glad to make equipment recommendations.

INSTALLATION

WARNING: Hazard of Electric Shock. Disconnect all power before installing heater.

1. **CAUTION: Do not scrape or scratch thermoplastic coating on heating elements. Damage could result.**
2. Before installing the type TPR and TPF heater, inspect it for possible damage which may have occurred during shipment. Also, check to insure the line voltage is the same as that on the nameplate.
3. **WARNING: Mount heater in the tank so the liquid level will always be above the effective heated portion of the heater. If heater is not properly sub-**

merged, it will overheat and damage the heating elements and create a possible fire due to excessive sheath temperature. (NOTE: Level indicator on plastic guard is 2" above heated section. Do not use the overtemperature control as a level control device, damage may result to the coating should an overtemperature condition exist.)

4. In an electroplating operation the heaters are not, under any circumstance, to be placed between the electrodes and the work.
5. **DANGER: Hazard of Fire and Toxic Fumes.** Since these heaters are capable of developing high temperatures, care should be taken to maintain liquid level above heated portion (Dimension B of Figures 1 and 2) of heater.

WIRING

WARNING: Hazard of Electric Shock. Any installation involving electric heaters must be effectively grounded in accordance with the National Electrical Code.

1. Electrical wiring to heater must be installed in accordance with the National Electrical Code and local codes by a qualified person.
2. Wire heater with manual reset thermal cutout as shown in Figures 3 thru 7.

NOTE: 1) Manual reset thermal cutout rating 25 Amps 120-277 Vac; 2) Customer supplied thermostat wiring not shown.

3. **WARNING: Entrance of corrosive fumes and vapors into the enclosure may damage internal parts. Use liquid-tight fitting and liquid-tight conduit for wiring entrance. Unused conduit opening must be sealed with snap-in plug provided. Assemble terminal cover tightly.**

OPERATION

1. Do not operate heater at voltages in excess of that stamped on the heater since excess voltage will shorten heater life.
2. Always maintain a minimum of 2" of solution above the heated portion of the element to prevent exposure of the effective heated length. If the heater is not properly submerged, it may overheat and shorten heater life. **Do not operate heater if dry.** (Note: Heated portion of element is Dimension B of Figures 1 and 2). Do not use the overtemperature control as a level control device, damage may result to the coating should an overtemperature condition exist.

3. Sludge should not be allowed to build-up to the point where it contacts heater as this can lead to premature heater failure.
4. Maximum recommended process temperature is 212°F.
5. If manual reset cutout trips, disconnect power to heater and check for cause of overheat condition. Check heater elements and coating for possible damage due to an overheat condition. Correct condition, then remove heater terminal cover and push black reset button to reset the cutout. Assemble terminal cover tightly before re-energizing heater.

MAINTENANCE

WARNING: Hazard of Electric Shock. Disconnect all power before servicing or replacing heater.

1. Heaters should be checked periodically for coating and corrosive buildup and cleaned if necessary.
2. Tank should be checked regularly for sediment around the end of heater as this sediment can act as an insulation and shorten heater life.

3. Note: Before thermoplastic heater is removed from solution, it should be allowed to cool from 15 to 20 minutes.
4. **CAUTION: Do not scratch or scrape elements when cleaning. Cleaning should be done chemically.**
5. To remove plastic guard - disconnect all plastic hardware attachments on guard assembly.

WIRING DIAGRAMS

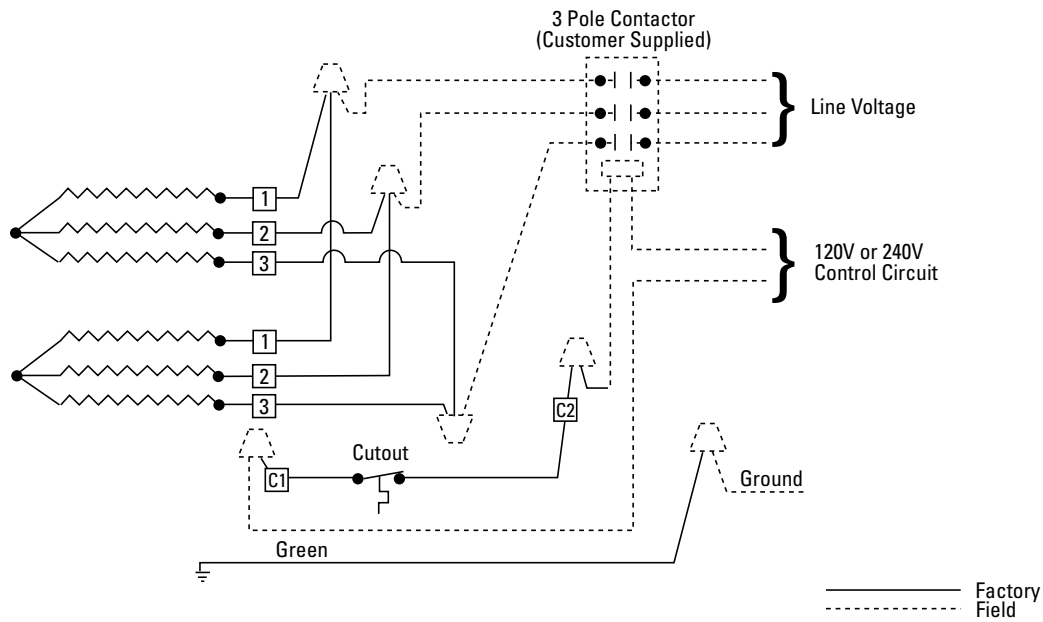


Figure 6 **Three Phase (TPF-602, -604, -802, -804, -1002, -1004)**

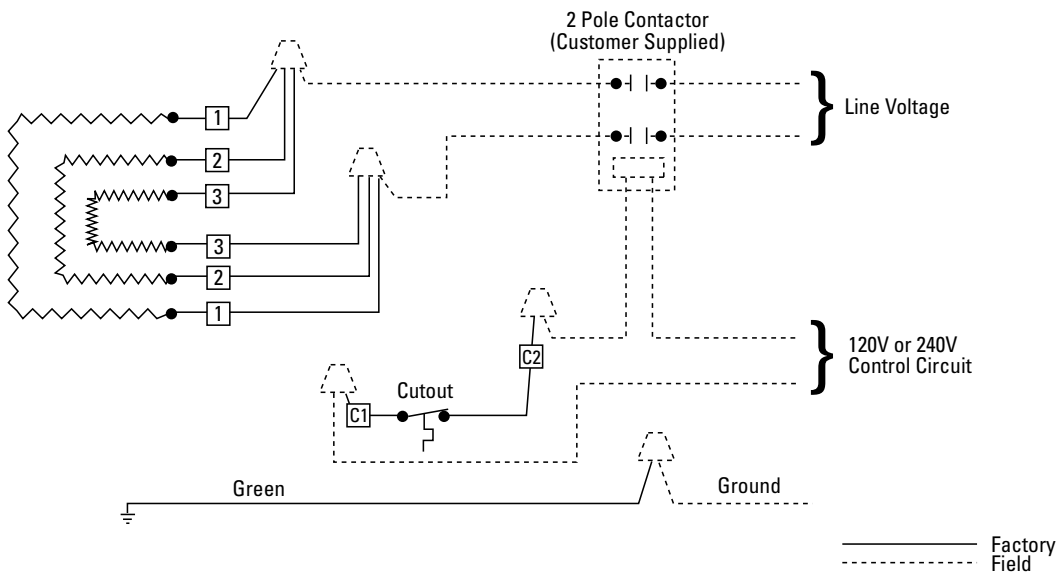


Figure 7 **Single Phase (TPF Rated 3kW and 4kW, 240 or 480 Volt)**

Limited Warranty:
Please refer to the Chromalox limited warranty applicable to this product at
<http://www.chromalox.com/customer-service/policies/termsofsale.aspx>.